ACTIVITY BRIEF
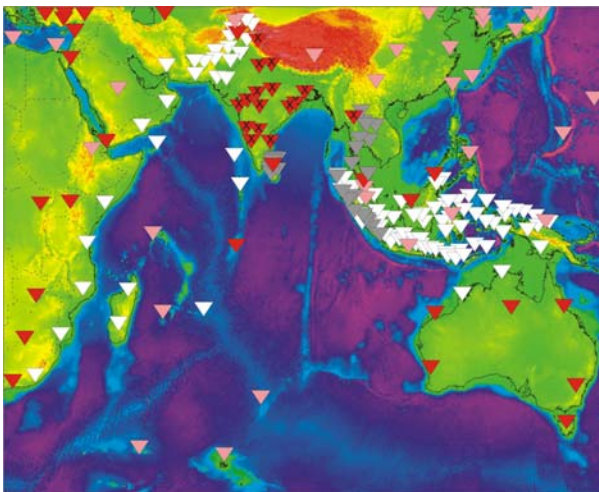# Building Capacity in Earthquake and Tsunami Detection for the Indian Ocean

▼ Existing broadband stations
▼ Existing non-broadband stations (to be upgraded)
▼ Existing broadband stations, not currently online in real-time
▽ Proposed USAID broadband stations
▽ Proposed broadband stations by international partners

Suggested international seismic station deployment/upgrade planned in the Indian Ocean region.

As a result of the tsunami of December 2004, the U.S. Government is supporting a multi-million dollar regional program as part of the international contribution to develop an Indian Ocean Tsunami Warning System. The U.S. Geological Survey (USGS) is a key partner under the US IOTWS Program, providing support to the Indian Ocean region through the upgrade of core seismic monitoring stations as well as training to increase the technical capacity to predict and forecast warnings.

Technical Training

Building capacity is critical to develop an effective warning system. To address this need, USGS has developed a five-day technical training program for each of the five Indian Ocean countries where the US IOTWS Program is working, namely Indonesia, Sri Lanka, Thailand, the Maldives, and India. The training will address multiple coastal hazards because national warning centers must prepare for various events, including tsunamis, cyclones, sea swells, flooding, landslides, and earthquake-induced strong ground motions. USGS is conducting these trainings in cooperation with UNESCO's International Oceanographic Commission (IOC), which leads the international effort to develop the IOTWS.

The training will address earthquake monitoring and tsunami warnings, with an emphasis on seismology. In addition, the training courses will include a discussion of methods used to facilitate interagency coordination, communicate warnings, and share seismic and oceanic data among participating regional countries.

The courses will also be tailored to country-specific needs, a reflection, in part, of each country's distance from the Sumatra trench which can generate tsunamis.

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Indonesia, for example, is located immediately adjacent to the trench and has a very short lead time for tsunami warnings. In contrast, Thailand is slightly further with over one hour lead time, and India, Sri Lanka and Maldives have warning times of about three hours or more.

Seismic stations such as the one shown here, would contribute to the networks currently under development to detect potential earthquakes in the Indian Ocean region that can cause tsunamis. Battery, Quanterra digitizer and CENS DCC (black box) (left); Parabolic antenna for data transmissions (right)

For more information on the seismology training program contact:
Mr. Shane Detweiler
US Geological Survey
shane@usgs.gov

US IOTWS Program Contacts

Orestes Anastasia
US IOTWS Program Manager
USAID Regional Development Mission/Asia
93/1 Diethelm Towers A, 10th Floor
Bangkok, 10330 Thailand
Tel: +66-2-263-7468
oanastasia@usaid.gov

Dr. Alan White
US IOTWS Program Integrator (Contractor)
Charter Square Building, Unit 1802
152 N. Sathorn Road, Bangrak
Bangkok, 10500 Thailand
Tel: +66-2-637-8518
alan.white@ttemi.com

www.us-iotws.gov

Goals and Objectives

The primary goal of this training program is to help technical specialists in each country understand the main components of an integrated tsunami warning system. While seismic monitoring is emphasized, courses address all stages of early warning, from initial hazard detection to the transfer of the warning message to local communities. Instructors present an overview of basic geophysical and seismological principles and describe the processes used to detect hazardous events and communicate those hazards through advanced warning systems. The tsunami warning systems currently in operation in Japan, Hawaii, and North America serve as practical examples for the training.

With a good understanding of the use of earthquake and tsunami detection instruments, and through cooperation with the international community, Indian Ocean nations will be able to detect and analyze an earthquake, and issue a warning within the time frame needed to save lives. This is the goal of the US IOTWS Program, and this seismic training is one step toward achieving this goal.

Training Course Outline

1. Historical introduction and the tectonic situation of the country
2. Introduction to earthquakes and tsunamis
3. Seismic theory and global and local seismic networks
4. Instrumentation (seismometers, recording systems, data transmission, etc.)
5. Seismic data analysis (hypocentral locations, magnitude, source mechanisms)
6. Hands-on exercises with data processing using PC computers
7. An integrated approach to tsunami and multi-hazard warnings

Depending on each country's priorities, instructors provide separate sessions on the specifics of operating, networking and maintaining seismic instruments. The USGS also offers technical assistance as needed to ensure that seismic instruments can be properly operated and that data is distributed to the international community.

About the US Indian Ocean Tsunami Warning System (IOTWS) Program
The US IOTWS Program is part of the international effort to develop tsunami warning system capabilities in the Indian Ocean following the December 2004 tsunami disaster. The US program adopts an "end-to-end" approach—addressing regional, national, and local aspects of a truly functional warning system—along with multiple other hazards that threaten communities in the region. In partnership with the international community, national governments, and other partners, the US program offers technology transfer, training, and information resources strengthen the tsunami warning and preparedness capabilities of national an

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U.S. Contribution to the
**Indian Ocean
Tsunami Warning
System**